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Index Lectionum

IN

LYCEO REGIO HOSIANO BRUNSBERGENSI

PER AESTATEM

ANNI MDCCCXLVIII A DIE II. MAJI

INSTITUENDARUM.

PRAEMISSA EST DR. LAUR. FELDTII FORMULAE BESSELIANAE DE LATITUDINE LOCORUM GEOGRAPHICA EVOLUTIO. ADJECTAE ADHUC SUNT DE FULMINIBUS CUM TONITRIBUS OBSERVATIONES BRUNSBERGENSES ET FRAUENBURGENSES.

BRUNSBERGAE,
IMPRESSIT C. A. HEYNE.

LYCEI REGII HOSIANI BRUNSBERGENSIS

RECTOR ET SENATUS

CIVIBUS SUIS

S.

Vir Amplissimus Celeberrimus ill. Bessel, cujus immaturam mortem disciplinae Astronomicae et Physico-Mathematicae nunquam satis lugebunt, et de quo summus Herschel ita disputat:

> „As a mathematician, Bessel takes, undoubtedly, a high rank; not, „indeed, as an original inventor in the abstract walks of the pure „analysis, but always with a view to applications, in w hich, wha- „tever occasion required its exertion, his skill was never found, une- „qual to the task on hand, no matter what its difficulty. — Equally „great in perfecting old methods of observation and in suggesting „new, the practice of the modern German school of astronomers is „almost emphatically Bessel's practice; and he was deservedly looked „ upon as a guide and model, not only in Germany but by Europe.
> Vid. A brief notice of the life, researches, and discoveries of Friedrich Wilhelm Bessel. By Sir J. F. W. Herschel pag. 16.

ad latitudinem locorum geographicam, ex observationibus ad primum circulum verticalem institutis, exquirendam, methodum ingeniosissimam atque simplicissimam proposuit. Ex hac sagacissimi Viri methodo, jam Vobis Cives ac Commilitones nobilissimi, momenta in hoc lectionum indice praecipua proponere placet. — Ecce jam rei seriem et ordinem.

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Sint T et T′ tempora sid. in primo vertic. circulo ad orientem et occidentem observata, τ et τ' correctiones chronometri; porro a et a′ azimuth. anguli, h et h′ anguli horarii, vocataque adhuc loci latitudine φ, stellae ascensione recta α et declinatione δ; triangulum sphaericum, quod polum aequatoris et punctum Zenith cum stella conjungit, suppeditabit:

$$\text{cotg a} \sin \text{h} = \text{tang}\,\delta \cos\varphi - \sin\varphi \cos \text{h}$$
$$\text{cotg a}' \sin \text{h}' = \text{tang}\,\delta \cos\varphi - \sin\varphi \cos \text{h}'.$$

Quodsi jam statuimus:

$$\text{a} = 180^0 - \text{a}', \text{ atque cotg a} = - \text{cotg. a}',$$

habebimus aequationem sequentem:

$$\sin \text{h}' \,[\text{tang}\,\delta \cos\varphi - \sin\varphi \cos \text{h}] = \sin \text{h} \,[\sin\varphi \cos \text{h}' - \text{tang}\,\delta \cos\varphi],$$

et hinc deducimus:

$$\text{tang}\,\delta\,[\sin \text{h}' + \sin \text{h}] = \text{tang}\,\varphi \sin(\text{h} + \text{h}')$$

sive etiam:

$$\text{tang}\,\varphi = \text{tang}\,\delta \frac{\cos {}^1/_2 (\text{h}' - \text{h})}{\cos {}^1/_2 (\text{h}' + \text{h})}. \qquad [\lambda]$$

Statuendo itaque Transit. $=$ AR $\pm$ Ang. hor., sive ponendo $^1/_2$ (h′ — h) $= \frac{T + T' + \tau + \tau'}{2} - \alpha$, $^1/_2$ (h′ + h) $= \frac{T' + \tau' - T - \tau}{2}$, — angulus hor. ad orientem ut negat. spectatur — formula [λ] induit formam hancce:

$$\text{tang}\,\varphi = \text{tang}\,\delta \frac{\cos\left\{\frac{T + T' + \tau + \tau'}{2} - \alpha\right\}}{\cos\left\{\frac{T' + \tau' - T - \tau}{2}\right\}}, \qquad [\xi]$$

quae inter formulas elegantissimas censeri debet, et jam cum ea convenit, quam cl. Bessel dedit: Nov. Astronom. No. 49.

Si aequatio [λ] jam nunc ita differentiatur, ut φ, α, δ, τ et τ' simul ut variabiles tractentur, prodibit aequatio:

$$\frac{d\varphi}{\cos^2\varphi} = \frac{d\delta}{\cos^2\delta} = \frac{\cos {}^1/_2 (\text{h}' - \text{h})}{\cos {}^1/_2 (\text{h}' + \text{h})} + d\alpha \;\text{tang}\,\delta \frac{\sin {}^1/_2 (\text{h}' - \text{h})}{\sin {}^1/_2 (\text{h}' + \text{h})} - \frac{d\tau}{2} \;\text{tang}\,\delta \frac{\sin \text{h}'}{\cos^2 {}^1/_2 (\text{h}' + \text{h})}$$
$$+ \frac{d\tau'}{2} \;\text{tang}\,\delta \frac{\sin \text{h}}{\cos^2 {}^1/_2 (\text{h}' + \text{h})},$$

et haec aequatio per combinationem cum formula [λ] illico sternit viam ad sequentem:

$$\frac{d\varphi}{\cos^2\varphi} = \frac{d\delta}{\cos^2\delta}\,\frac{\mathrm{tang}\,\varphi}{\mathrm{tang}\,\delta} + d\alpha\,\mathrm{tang}\,\varphi\,\mathrm{tang}\,{}^1/_2\,(h'-h) - \frac{d\tau}{2}\,\frac{\mathrm{tang}\,\varphi\,\sin h'}{\cos{}^1/_2(h'-h)\cos{}^1/_2(h'+h)}$$
$$+ \frac{d\tau'}{2}\,\frac{\mathrm{tang}\,\varphi\,\sin h}{\cos{}^1/_2(h'-h)\cos{}^1/_2(h'+h)},$$

quam aequationem jam hunc in modum repraesentare licet:

$$d\varphi = d\delta\,\frac{\sin 2\varphi}{\sin 2\delta} + \frac{d\alpha}{2}\sin 2\varphi\,\mathrm{tang}\,{}^1/_2\,(h'-h) - \frac{d\tau}{2}\,\frac{\sin 2\varphi\,\sin h'}{\cos h' + \cos h} + \frac{d\tau'}{2}\,\frac{\sin 2\varphi\,\sin h}{\cos h' + \cos h}\,.\ [\psi]$$

Statuendo nunc tubum astronomicum sub angulo recto ad meridianum i. e. ponendo:

$$\frac{T + T' + \tau + \tau'}{2} = \alpha,$$

e formulis supra traditis [ξ] et [ψ] sponte deducitur:

$$\mathrm{tang}\,\varphi = \mathrm{tang}\,\delta\,\sec\left\{\frac{T' + \tau' - T - \tau}{2}\right\} \qquad [\xi']$$

$$d\varphi = d\delta\,\frac{\sin 2\varphi}{\sin 2\delta} + {}^1/_2\left\{\frac{d\tau'}{2} - \frac{d\tau}{2}\right\}\sin 2\varphi\ \mathrm{tang}\,{}^1/_2\left\{T' + \tau' - T - \tau\right\} \qquad [\psi^1]$$

Quae a cl. Bessel exhibitae sunt formulae. Conf. Nov. Astronom. No. 49.

Formulae praeced. [ξ¹] et [ψ¹] jam omnia continent, quae ad computum latitudinis locorum geograph., ex observationibus ad primum circulum verticalem institutis, requiruntur.

Pro stella puncto Zenith proxima, ponendo $d\tau' - d\tau = 0$, habebimus:

$$d\varphi = d\delta\,\frac{\sin 2\varphi}{\sin 2\delta},$$

et pro transitu stellae per punctum Zenith:

$$d\varphi = d\delta$$

i. e. error totus in declinatione etiam est in latitudine geographica. Tandem et nullo praecisionis detrimento in formulis supra evolutis pro tubi astronomici positione, adhibere licebit:

$${}^1/_2\,(h' - h) = 1'\,30''.$$

Ut nunc jam ad latitudinem locorum geographicam exquirendam in promtu sint omnia, adnotemus adhuc stellas Besselianas sequentes:

	AR. 1833.			Decl. 1833.		
β. Draconis - - - - -	261°	39′	56.″58	52°	25′	40.″23
γ.——— - - - - -	268	10	57. 72	51	30	41. 80
XVIII. 170 - - - - -	279	0	37. 76	52	2	29. 70
k. Cygni - - - - - -	288	18	37. 24	53	3	47. 41
7.——— - - - - -	290	50	8. 10	51	58	58. 84
i.——— - - - - -	291	22	24. 92	51	22	36. 52
θ.——— - - - - -	292	59	26. 14	49	50	15. 60
ψ.——— - - - - -	297	49	39. 47	51	59	54. 13

Vid. Bessel Gradmessung in Ost-Preussen etc. pag. 318.

Haec hactenus. — Expositionem et amplificationem methodi ingeniosissimae Besselianae etiam vir sagacissimus cl. Hansen in Commentatione inscripta: Ueber die Bestimmung der Polhöhe durch ein in der Richtung von Osten nach Westen aufgestelltes Passageninstrument, Nov. Astronom. No. 126 dedit. Conf. etiam: Bessel über den allgemeinen Gebrauch des Passageninstruments Nov. Astronom. 131. — Recentissime et ill. Grunert in Opere: Beiträge zur reinen und angewandten Mathematik pag. 148 methodum simplicissimam ad poli elevationem exquirendam tradidit.

De fulminibus cum tonitribus observationes Brunsbergenses et Frauenburgenses.

Observationes de fulminibus cum tonitribus Frauenburgenses sequentes summa cum diligentia ab Illustr. ac Reverendiss. Dr. de Dittersdorf Canonic. Ecclesiae Cathed. ab anno 1844 usque ad annum 1847 institutae sunt. Ex his ill. de Dittersdorf observationibus hic jam eas tantum illustrare propositum est, quae ad comparationem cum observationibus Brunsbergensibus pertinent. Observationes huc pertinentes jam hae sunt.

Numerus observationum ab anno 1844 usque ad annum 1847 incls. institutarum.

	Brunsbergae: 71. Medium.	Frauenburgi: 67. Medium
Jan.	0. 00	0. 00
Febr.	0. 00	0. 00
Mart.	0. 00	0. 00
April.	1. 50	1. 50
Maj.	2. 22	2. 50
Jun.	2. 22	2. 25
Jul.	4. 75	3. 50
August.	5. 75	5. 75
Septembr.	0. 25	0. 25
Octobr.	1. 00	1. 00
Novembr.	0. 00	0. 00
Decembr.	0. 00	0. 00

Hinc simul petitur Num. fulm. cum tonitribus:

		Brunsbergae.	Frauenburgi.
e regione australi	S.	10 fulm. c. tonitr.	11 fulm. c. tonitr.
—— occidentali	W.	2 ——	1 ——
—— septentrionali	N.	0 ——	0 ——
—— orientali	O.	0 ——	1 ——

Media directio:

		Brunsbergae.	Frauenburgi.
inter merid. et occidentem	SW.	27 fulm. c. tonitr.	21 fulm. c. tonitr.
—— merid. et orient.	SO.	12 ——	10 ——
—— septentr. et occid.	NW.	10 ——	12 ——
—— septentr. et orient.	NO.	10 ——	11 ——

Per combinationem harum observationum cum observationibus ab anno 1834 usque ad annum 1847 incl. factis — observationes huc pertinentes jam in Ind. lectionum Lycei nostri pro Ann. MDCCCXLIV reperiuntur — prodit.

Numerus observationum omnium ab anno 1834 usque ad annum 1847 incls. institutarum.

Brunsbergae: 321. Frauenburgi: 285.

	Medium.	Medium.
Jan.	0. 05	0. 05
Febr.	0. 00	0. 00
Mart.	0. 00	0. 00
April.	1. 40	1. 30
Maj.	3. 26	3. 25
Jun.	4. 96	4. 52
Jul.	4. 62	3. 60
August.	5. 12	4. 82
Septembr.	1. 22	1. 02
Octobr.	0. 65	0. 60
Novembr.	0. 05	0. 05
Decembr.	0. 00	0. 00

Hinc sumendo Medium ex observationibus Brunsbergensibus et Frauenburgensibus ad Mare Balticum obtinemus: 20. 295 fulm. c. tonitribus.

Reductione nunc ad 100 facta, nanciscimur:

	Brunsbergae.	Frauenburgi.
Numer. mensium hiemis:	0. 23 pr. Cent.	0. 26 pr. Cent.
——— veris:	21. 85 ———	23. 88 ———
——— aestatis:	68. 92 ———	67. 19 ———
——— autumni:	9. 00 ———	8. 67 ———

Sed de observationibus addigitatis et de mercurii altitudine jam nobis in Annall. cl. Poggendorff fusius agendum erit. — Valete.

P. P. in Lyceo Regio Hosiano Brunsbergensi M. Januar. MDCCCXLVIII.

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